

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 10-234713

(43)Date of publication of application : 08.09.1998

(51)Int.Cl.

A61B 5/12

(21)Application number : 09-045844

(71)Applicant : RION CO LTD

(22)Date of filing : 28.02.1997

(72)Inventor : KUROSAWA TAKAHIRO

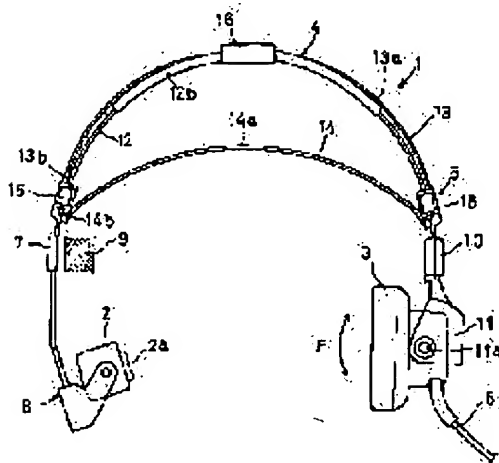
(54) BONE CONDUCTION RECEIVER DEVICE FOR HEARING TEST

(57)Abstract:

PROBLEM TO BE SOLVED: To enable a inexperienced in hearing test to wear a bone conduction receiver device easily, which was problematic for him due to intricate procedure of its wearing.

SOLUTION: A first connection member 7 is provided at one end of a headband 4, and a second connection member 10, at the other end of the headband 4. A bone conduction receiver 2 is fixed to the first connection member 7, and an air conduction receiver 3 for masking is fixed to the second connection member 10, and a pad part 9 contacting to the head of the subject is formed on the inside of the first connection member 7. One of the first connection member 7 and the second connection member 10 is, or both are, freely twistable to the headband 4, and the bone conduction receiver 2 is fixed to the first connection member 7 with degree of freedom for

two or three axes.



DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the bone conduction receiver equipment for hearing tests used in inspection which measures bone conduction hearing.

[0002]

[Description of the Prior Art] As conventional acoustic-sense checking bone conduction receiver equipment, as shown in drawing 9, the joint member 101,102 is fixed to the both ends of the head strap 100 which changes by two curved elastic members, respectively, and the sliding rod 103,104 is fitted in the joint member 101,102 free [sliding].

[0003] The bone-conduction-receiver attachment component 105 which consists of spacer 105a, flat-spring member 105b of a U character configuration, and attachment component 105c of a U character configuration is fixed to the lower limit of one sliding rod 103, and the bone-conduction receiver 106 is attached in the bone-conduction-receiver attachment component 105. The air conduction earphone attachment component 107 is fixed to the lower limit of the sliding rod 104 of another side, and the air conduction earphone 108 is attached in the air conduction earphone attachment component 107. In addition, 109,110 is a code which supplies an inspection signal to a bone-conduction receiver 106 and the air conduction earphone 108.

[0004] Here, the opposite distance of the joint member 101,102 is adjustable by the head strap 100 which changes by the elastic member. And the bone-conduction receiver 106 is attached in the direction of an arrow head A free [a neck swing] at attachment component 105c. Moreover, the sliding rod 103 can slide in the direction of arrow-head B. On the other hand, the air conduction earphone 108 is attached in the direction of arrow-head C free [a neck swing] at the air conduction earphone attachment component 107. Moreover, the sliding rod 102 can slide in the direction of arrow-head D, and is still more rotatable also to a cross direction.

[0005] When wearing the bone conduction receiver equipment for hearing tests on a head, the subject grasps the joint member 101,102 with both hands first, and it is in the condition which carried out distance between the joint members 101,102 more than the width of face of a head, and is made for excitation edge 106a of a bone-conduction receiver 106 to contact the mastoid process of ear-pinna back. Subsequently, it is common to make the sliding rod 104 incline forward suitably by one hand, to release one's hold in a location where the air conduction earphone 108 covers an ear pinna, and to wear the bone conduction receiver equipment for hearing tests on a head.

[0006]

[Problem(s) to be Solved by the Invention] However, in the hearing checking bone conduction receiver equipment shown in drawing 9, since the sequence of wearing is complicated, puzzlement will be given to an audiometry at the unfamiliar subject. Moreover, in the group audiometry which must inspect many subject, time amount was spent too much and there was a problem that inspection was efficiently impossible as a whole. Moreover, since the amount of moving part and excitation edge 106a of a bone-conduction receiver 106 contacted a mastoid process in the unstable condition, the problem that it was not correctly transmitted to a mastoid process also had the exciting force of a bone-conduction receiver 106. [too]

[0007] The place which this invention is made in view of such a trouble that a Prior art has, and is made into the purpose tends to offer the hearing checking bone conduction receiver equipment which can be worn easily and quickly, even if it is the subject

unfamiliar to an audiometry.

[0008]

[Means for Solving the Problem] That the above-mentioned technical problem should be solved, this invention forms the pad section which contacts the head of the subject inside said 1st connection member while preparing the 1st connection member in the end of a head strap, preparing the 2nd connection member in the other end, and it attaching a bone-conduction receiver in said 1st connection member and attaching the earphone for masking in said 2nd connection member.

[0009] Both said 1st connection members and 2nd connection members are good in a twist being free to said head strap. [both / either or]

[0010] Said bone-conduction receiver is good to attach with the degree of freedom of biaxial or three shafts to said 1st connection member.

[0011]

[Embodiment of the Invention] The gestalt of operation of this invention is explained based on an accompanying drawing below. The front view of the hearing checking bone conduction receiver equipment which drawing 1 requires for this invention here, the perspective view in which drawing 2 shows the attachment condition to the head strap of a bone-conduction receiver, The perspective view in which drawing 3 shows the attachment condition to the head strap of an air conduction earphone, and drawing 4 The E-E line sectional view of drawing 3 , It is a top view in the condition that drawing in which drawing 5 shows the decomposition perspective view of a wire-like member and the 1st connection member, and drawing 6 shows the engagement condition of a wire-like member and the 1st connection member, and drawing 7 equipped the head with the decomposition perspective view of a wire-like member and the 2nd connection member, and drawing 8 equipped with hearing checking bone conduction receiver equipment.

[0012] As shown in drawing 1 , hearing checking bone conduction receiver equipment 1 consists of the head strap section 4 which gives the predetermined wearing force to the subject while connecting the bone-conduction receiver 2 which gives exciting force to the mastoid process of a head, the air conduction earphone 3 for masking, and a bone-conduction receiver 2 and the air conduction earphone 3, the adjustment section 5 which makes the head strap section 4 support a bone-conduction receiver 2 and the air conduction earphone 3 in the condition [**** / for the subject]. In addition, 6 is a code which inputs a sound signal into the air conduction earphone 3, and the publication of the code which inputs an inspection signal into a bone-conduction receiver 2 is omitted.

[0013] The bone-conduction receiver 2 is attached in the 1st connection member 7 prepared in the end of the head strap section 4 through the bone-conduction-receiver attachment component 8. In the 1st connection member 7, the pad section (for example, product made of foaming polyurethane rubber) 9 which contacts a head and the medial surface which counters on the head of the subject has fixed.

[0014] The air conduction earphone 3 is attached in the 2nd connection member 10 prepared in the other end of the head strap section 4 through the air conduction earphone attachment component 11. the air conduction earphone attachment component 11 -- a core [a / pivot section 11] -- carrying out -- the air conduction earphone 3 -- the direction of arrow-head F -- rotation -- being free (for example, include angle of about 50 degrees) -- it holds.

[0015] The head strap section 4 consists of two wire-like members 12 of the elastic

bodies (for example, piano wire, stainless steel, etc.) formed in the shape of abbreviation for U characters, and covering 12b by resin is given to a part of wire-like member 12. Moreover, the edge of the wire-like member 12 which counters mutually is attached in the 1st connection member 7 and the 2nd connection member 10, respectively. And if it is going to pull apart the connection members 7 and 10 on either side more than the face width of the subject, the elastic force of the direction which brings mutually the connection members 7 and 10 on either side close to the wire-like member 12 formed in the shape of abbreviation for U characters will occur.

[0016] Moreover, the adjustment section 5 consists of a holddown member 16 which connects mutually a center section and the center section of the wire-like member 12 of the band-like band members 13 and 14 which are two sheets from which die length differs, the attachment member 15 of a Uichi Hidari pair which fixed to the both ends of these band-like band members 13 and 14, and the band-like band member 13 of the longer one, and is fixed.

[0017] The band-like band member 13 of the longer one is formed by the polymeric materials which have an elastic member, for example, spring nature, and the band-like band member 14 of the shorter one is formed with a flexible member, i.e., a member which contacts the head softly, for example, fluororesin material, leather, cloth, etc. And the long band-like band member 13 and the short band-like band member 14 make the fields 13a and 14a counter mutually, and are arranged in the state of the segment configuration. The long band-like band member 13 is fixing the center section to the attachment member 15 of right and left of the edge 13b at the holddown member 16. Moreover, the short band-like band member 14 is fixing the edge 14b to the attachment member 15 on either side.

[0018] As shown in drawing 2, the attachment member 15 fixes the edges 13b and 14b of the band-like band members 13 and 14 in the center section, forms pore 15c in both ends further, and is fitting the wire-like member 12 in pore 15c free [sliding]. As shown in drawing 6, the middle of the band-like band member 13 is fixed in the center section, and a holddown member 16 forms pore 16c in both ends further, it fits the wire-like member 12 in pore 16c, and is fixed.

[0019] The 1st connection member 7 which attaches edge 12a of the wire-like member 12 and the bone-conduction-receiver attachment component 8 consists of the case sections 20 and 21 of a pair, as shown in drawing 5. The opening slots 20a and 21a and the circular sulci 20b and 21b which are open for free passage into the opening slots 20a and 21a are formed in the part which counters mutually [both ends], respectively at the case sections 20 and 21.

[0020] Moreover, heights 20c is prepared in the part which is most distant from opening slot 20a by circular-sulcus 20b of one case section 20, and heights 21c is prepared near the opening slot 21a by circular-sulcus 21b of the case section 21 of another side. Furthermore, Crevices 20d and 21d are formed in the part which counters the case sections 20 and 21 mutually [a center], respectively.

[0021] And in order to connect the 1st connection member 7 with the head strap section 4, while letting it pass into the opening slots 20a and 21a on both sides of edge 12a of the wire-like member 12 bent to cyclic in the case sections 20 and 21 of a pair It contains to circular sulci 20b and 21b, and he unifies the case sections 20 and 21 in total by **** 22 further, and is trying for edge 12a of the wire-like member 12 not to separate from the 1st

connection member 7.

[0022] In order to connect the 1st connection member 7 and the bone-conduction-receiver attachment component 8 to coincidence, bending and its cyclic edge 23a are engaged with cyclic through a spacer (un-illustrating) in crevices 20d and 21d in edge 23a of the shank material 23 which constitutes the bone-conduction-receiver attachment component 8. Subsequently, cyclic edge 23a is made to penetrate **** 22, and the case sections 20 and 21 are made to unify **** 22 in total. Then, the shank material 23 is attached in the 1st connection member 7 free [rotation]. In addition, drawing 6 shows the condition that edge 12a of the wire-like member 12 engages with circular-sulcus 20b of the case section 20, and cyclic edge 23a of the shank material 23 is engaging with 20d of crevices.

[0023] And as shown in drawing 2, by the case sections 20 and 21 of a pair ****ing and unifying by 22 bundles, opening slot 20a of the case section 20 and opening slot 21a of the case section 21 are put together to the 1st connection member 7, and the opening 24 of the shape of a larger long hole than the cross section of the wire-like member 12 is formed in it.

[0024] Therefore, although edge 12a of the wire-like member 12 is contained by the circular sulci 20a and 21a of the 1st connection member 7, it is in a loosely-fitting condition, and since the wire-like member 12 near the edge 12a is moreover inserted within opening 24, the 1st connection member 7 2, i.e., a bone-conduction receiver, can be twisted in the direction of arrow-head G to the head strap section 4.

[0025] here, the bone-conduction-receiver attachment component 8 is shown in drawing 2 -- as -- from said shank material 23 carried out and an attachment component 25 -- becoming -- the end of the shank material 23 -- the 1st connection member 7 -- the direction of arrow-head H -- rotation -- being free (for example, include angle of about 60 degrees) -- it attaches -- having -- the other end of the shank material 23 -- an attachment component 25 -- the direction of arrow-head I -- rotation -- being free (for example, include angle of about 20 degrees) -- it is attached. furthermore, the attachment component 25 -- a bone-conduction receiver 2 -- the direction of arrow-head J -- rotation -- being free (for example, include angle of about 50 degrees) -- it is attached. That is, a bone-conduction receiver 2 will have three degrees of freedom of the direction of arrow-head H, the direction of arrow-head I, and the direction of arrow-head J to the 1st connection member 7.

[0026] In addition, since the 1st connection member 7 is twisted in the direction of arrow-head G to the head strap section 4 even if it is the case where it has two degrees of freedom of the direction of arrow-head H, and the direction of arrow-head J, it can be made the posture of a request of a bone-conduction receiver 2, and a mastoid process can be contacted in excitation edge 2a.

[0027] The 2nd connection member 10 which attaches edge 12a of the wire-like member 12 and the air conduction earphone attachment component 11 consists of the air conduction earphone attachment component 11, a connection body 30 formed in one, and a connection lid 31, as shown in drawing 7. The opening slots 30a and 31a and the circular sulci 30b and 31b which are open for free passage into the opening slots 30a and 31a are formed in the part which counters the connection body 30 and the connection lid 31 mutually [both ends], respectively. Moreover, heights 30c is prepared in the part which is most distant from opening slot 30a by circular-sulcus 30b of the connection body 30, and heights 31c is further prepared near the opening slot 31a by circular-sulcus

31b of the connection lid 31.

[0028] And in order to connect the 2nd connection member 10 with the head strap section 4, while letting it pass into the opening slots 30a and 31a on both sides of edge 12a of the wire-like member 12 bent to cyclic with the connection body 30 and the connection lid 31, it contains to circular sulci 30b and 31b. Furthermore, he unifies the connection body 30 and the connection lid 31 in total by **** 32, and is trying for edge 12a of the wire-like member 12 not to separate from the 2nd connection member 10.

[0029] Then, as shown in drawing 3, by the connection body 30 and the connection lid 31 ****ing, and unifying by 32 bundles, opening slot 30a of the connection body 30 and opening slot 31a of the connection lid 31 are put together to the 2nd connection member 10, and the opening 33 of the shape of a larger long hole than the cross section of the wire-like member 12 is formed in it.

[0030] Therefore, although edge 12a of the wire-like member 12 is contained by the circular sulci 30a and 31a of the 2nd connection member 10, it is in a loosely-fitting condition, and since the wire-like member 12 near the edge 12a is moreover inserted within opening 33, the 2nd connection member 10 3, i.e., an air conduction earphone, can be twisted to the head strap section 4 in the direction of arrow-head K.

[0031] An operation of the hearing checking bone conduction receiver equipment 1 constituted as mentioned above is explained. He is trying for the distance between the fields where the earphones 2 and 3 on either side counter mutually to mainly become shorter than the face width of the subject according to the elastic force of the wire-like member 12 in the condition that hearing checking bone conduction receiver equipment 1 is not worn. Moreover, the attachment member 15 on either side is in the location which approached earphones 2 and 3 most according to the elastic force of the band-like band members 13 and 14.

[0032] First, the case where the subject of the magnitude of the ordinary head equips with hearing checking bone conduction receiver equipment 1 is explained. If the subject resists the elastic force of the wire-like member 12 and detaches the earphones 2 and 3 on either side with the earphone attachment components 8 and 11 or the connection members 7 and 10 on either side more than a face width, with the short predetermined die length and the short segment configuration of the band-like band member 14, the attachment member 15 on either side will resist the elastic force of the long band-like band member 13, and it will move in the direction which separates from earphones 2 and 3 along with the wire-like member 12.

[0033] Subsequently, where the earphones 2 and 3 on either side are detached more than a face width, taking down hearing checking bone conduction receiver equipment 1 from the head upper part, it is going to apply the pad section 9 to a head flank, and is going to apply the air conduction earphone 3 to an ear pinna. Then, since the distance between the fields where the 1st connection member 7 and the 2nd connection member 10 counter mutually becomes short, the attachment member 15 on either side moves in the direction which approaches earphones 2 and 3 along with both the wire-like members 12 according to a collaboration operation with that the short band-like band member 14 is set as predetermined die length, and the elastic force of the long band-like band member 13. And if short field 14a of the band-like band member 14 contacts near the head top-most vertices of the subject, by setting the short band-like band member 14 as predetermined die length, the attachment member 15 will suspend migration and will be positioned.

[0034] Moreover, the air conduction earphone 3 can contact [as opposed to / conjointly / an ear pinna] with the optimal posture that the rotation of the air conduction earphone 3 in the direction of arrow-head F has been attained to the air conduction earphone attachment component 11 since the twist [direction / of arrow-head K] of the air conduction earphone 3 has become [as opposed to / in case the air conduction earphone 3 contacts the ear pinna of the subject, as it is shown in drawing 3 / the head strap section 4] free.

[0035] On the other hand, as shown in drawing 2 , with three degrees of freedom of the direction of arrow-head H on the basis of the pad section 9 which is in contact with the head flank of the ear-pinna upper part, the direction of arrow-head I, and the direction of arrow-head J, a bone-conduction receiver 2 can be made into a desired posture, and can contact a mastoid process in excitation edge 2a.

[0036] Moreover, even if it resists the elastic force of the wire-like member 12 and detaches the earphones 2 and 3 on either side beyond a predetermined distance In the 2nd connection member 10, since edge 12a of the wire-like member 12 contacts the heights 30c and 31c of circular sulci 30b and 31b as shown in drawing 4 , it can prevent that the 2nd connection member 10 moves in the direction of outside superfluously, and, thereby, good wearing nature can be obtained. In addition, also in the 1st connection member 7, edge 12a of the wire-like member 12 contacts the heights 20c and 21c of circular sulci 20b and 21b like the 2nd connection member 10, and it can prevent that the 1st connection member 7 moves in the direction of outside superfluously.

[0037] Therefore, the moderate wearing force according to work of the elastic force of the wire-like member 12 and the long band-like band member 13 as the subject is shown in drawing 8 , The optimal posture over the mastoid process 40 or ear pinna 41 of earphones 2 and 3 by the twist of earphones 2 and 3 to the head strap section 4, When field 14a of the center section of the short band-like band member 14 contacts stability near the top-most vertices of the head 42 of the subject, it can equip with hearing checking bone conduction receiver equipment 1 comfortably.

[0038] Next, the case where the long subject equips with hearing checking bone conduction receiver equipment 1 compared with a person with the ordinary die length applied to the parietal region from an ear pinna is explained. If the subject resists the elastic force of the wire-like member 12 and detaches the earphones 2 and 3 on either side with the earphone attachment components 8 and 11 or the connection members 7 and 10 on either side more than a face width, with the short predetermined die length and the short segment configuration of the band-like band member 13, the attachment member 15 on either side will resist the elastic force of the long band-like band member 14, and it will move in the direction which separates from earphones 2 and 3 along with the wire-like member 12.

[0039] Subsequently, where the earphones 2 and 3 on either side are detached more than a face width, taking down hearing checking bone conduction receiver equipment 1 from the head upper part, it is going to apply the pad section 9 to a head flank, and is going to apply the air conduction earphone 3 to an ear pinna. Then, field 13a of the band-like band member 13 with the subject short since the vertical distance of the top-most vertices of a head and an ear pinna is long, before the air conduction earphone 3 becomes the location of an ear pinna contacts near the top-most vertices of the head of the subject.

[0040] Furthermore, if the air conduction earphone 3 is lowered to the location of an ear

pinna, it will move in the direction which the attachment member 15 resists the elastic force of the long band-like band member 14, and separates from earphones 2 and 3 along with the wire-like member 12 by the thrust of a head to field 13a of the short band-like band member 13.

[0041] And after short field 13a of the band-like band member 13 has contacted near the head top-most vertices of the subject in an ear pinna, since the short band-like band member 13 is set as predetermined die length, the attachment member 15 suspends migration and is positioned in the location where the air conduction earphone 3 is best.

[0042] Then, the moderate wearing force according to work of the elastic force of the wire-like member 12 and the long band-like band member 14 as the subject is shown in drawing 8 , The optimal posture over the mastoid process 40 or ear pinna 41 of earphones 2 and 3 by the twist of earphones 2 and 3 to the head strap section 4, When field 14a of the center section of the short band-like band member 14 contacts stability near the top-most vertices of the head 42 of the subject, it can equip with hearing checking bone conduction receiver equipment 1 comfortably.

[0043]

[Effect of the Invention] Since the pad section which contacts a head was prepared in the head strap by the side of a bone-conduction receiver according to this invention as explained above, after equipping stability with a head strap, a bone-conduction receiver can be operated independently and a head can be contacted easily.

[0044] Since the twist of both the 1st connection member, and 2nd connection both [either or] has become free to the head strap, wearing on a head becomes easy and, moreover, wearing is more possible for stability to a head.

[0045] Moreover, since a bone-conduction receiver is attached with the degree of freedom of biaxial or three shafts to the 1st connection member, it can perform contacting a desired head with a desired posture easily, and improvement in precision of inspection can be aimed at.

(19)日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11)特許出願公開番号

特開平10-234713

(43)公開日 平成10年(1998)9月8日

(51)Int.Cl.⁵

A 6 1 B 5/12

識別記号

F I

A 6 1 B 5/12

審査請求 未請求 請求項の数3 O L (全 7 頁)

(21)出願番号 特願平9-45844

(22)出願日 平成9年(1997)2月28日

(71)出願人 000115636

リオン株式会社

東京都国分寺市東元町3丁目20番41号

(72)発明者 黒沢 高弘

東京都国分寺市東元町3丁目20番41号 リ

オン株式会社内

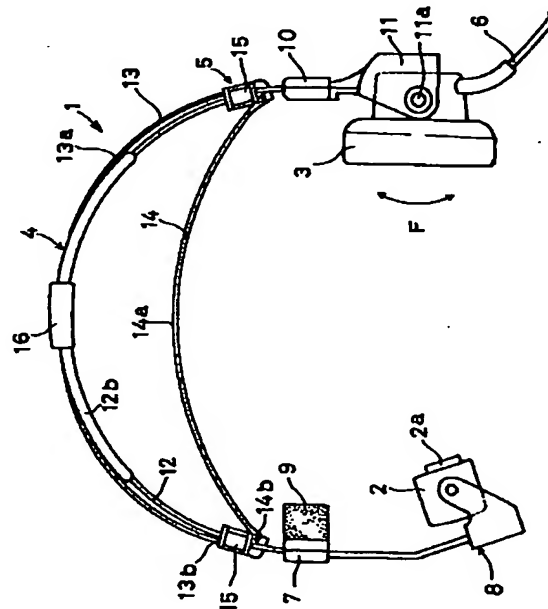
(74)代理人 弁理士 小山 有 (外1名)

(54)【発明の名称】 聴覚検査用骨導受話装置

(57)【要約】

【課題】 装用の順序が複雑であるため、聴力検査に不慣れな被検者に戸惑いを与えてしまう。

【解決手段】 ヘッドバンド4の一端に第1連結部材7を、他端に第2連結部材10を設け、第1連結部材7には骨導受話器2を取付け、第2連結部材10にはマスキング用気導受話器3を取付けると共に、第1連結部材7の内側には被検者の頭部と当接するパッド部9を形成し、第1連結部材7と第2連結部材10のいずれか一方又は両方が、ヘッドバンド4に対して振れ自在であり、骨導受話器2は、第1連結部材7に対し2軸又は3軸の自由度をもって取付けられる。



【特許請求の範囲】

【請求項1】 ヘッドバンドの一端に第1連結部材を、他端に第2連結部材を設け、前記第1連結部材には骨導受話器を取付け、前記第2連結部材にはマスキング用受話器を取付けると共に、前記第1連結部材の内側には被検者の頭部と当接するパッド部を形成したことを特徴とする聴覚検査用骨導受話装置。

【請求項2】 前記第1連結部材と第2連結部材のいずれか一方又は両方が、前記ヘッドバンドに対して振れ自在である請求項1記載の聴覚検査用骨導受話装置。

【請求項3】 前記骨導受話器は、前記第1連結部材に対し2軸又は3軸の自由度をもって取付けられる請求項1又は2記載の聴覚検査用骨導受話装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、骨導聴力を測定する検査において用いられる聴覚検査用骨導受話装置に関する。

【0002】

【従来の技術】従来の聴覚検査用骨導受話装置として、図9に示すように、湾曲した2本の弾性部材で成るヘッドバンド100の両端に、それぞれジョイント部材101、102を固定し、ジョイント部材101、102に摺動ロッド103、104を摺動自在に嵌挿している。

【0003】一方の摺動ロッド103の下端には、スペーサ105a、U字形の板バネ部材105b及びU字形の保持部材105cからなる骨導受話器保持部材105が固定され、骨導受話器保持部材105に骨導受話器106が取付けてある。他方の摺動ロッド104の下端には、気導受話器保持部材107が固定され、気導受話器保持部材107に気導受話器108が取付けてある。なお、109、110は、骨導受話器106および気導受話器108に検査信号を供給するコードである。

【0004】ここで、ジョイント部材101、102の対向距離は弾性部材で成るヘッドバンド100により可変である。そして、骨導受話器106は、保持部材105cに矢印Aの方向に首振り自在に取付けてある。また、摺動ロッド103は矢印B方向に摺動可能である。一方、気導受話器108は、気導受話器保持部材107に矢印C方向に首振り自在に取付けてある。また、摺動ロッド102は矢印D方向に摺動可能であり、更に前後方向にも回転可能である。

【0005】聴覚検査用骨導受話装置を頭部に装着する場合、被検者は、まず両手でジョイント部材101、102を把持し、ジョイント部材101、102間の距離を頭部の幅以上にした状態で、耳介後方の乳様突起に骨導受話器106の加振端部106aが当接するようにする。次いで、一方の手で摺動ロッド104を適宜前方向に傾斜させ、気導受話器108が耳介を覆うような位置

で手を放し、聴覚検査用骨導受話装置を頭部に装着するのが一般的である。

【0006】

【発明が解決しようとする課題】しかし、図9に示す聴覚検査用骨導受話装置においては、装用の順序が複雑であるため、聴力検査に不慣れな被検者に戸惑いを与えてしまう。また、多数の被検者を検査しなければならない集団聴力検査等においては、時間を費やしすぎ全体として効率よく検査ができないという問題があった。また、可動部分が多過ぎるので、骨導受話器106の加振端部106aが不安定な状態で乳様突起に当接するため、骨導受話器106の加振力が乳様突起に正しく伝達されないという問題もあった。

【0007】本発明は、従来の技術が有するこのような問題点に鑑みてなされたものであり、その目的とするところは、聴力検査に不慣れな被検者であっても容易且つ迅速に装用できる聴覚検査用骨導受話装置を提供しようとするものである。

【0008】

【課題を解決するための手段】上記課題を解決すべく本発明は、ヘッドバンドの一端に第1連結部材を、他端に第2連結部材を設け、前記第1連結部材には骨導受話器を取付け、前記第2連結部材にはマスキング用受話器を取付けると共に、前記第1連結部材の内側には被検者の頭部と当接するパッド部を形成したものである。

【0009】前記第1連結部材と第2連結部材のいずれか一方又は両方が、前記ヘッドバンドに対して振れ自在であるとよい。

【0010】前記骨導受話器は、前記第1連結部材に対して2軸又は3軸の自由度をもって取付けるとよい。

【0011】

【発明の実施の形態】以下に本発明の実施の形態を添付図面に基づいて説明する。ここで、図1は本発明に係る聴覚検査用骨導受話装置の正面図、図2は骨導受話器のヘッドバンドへの取付状態を示す斜視図、図3は気導受話器のヘッドバンドへの取付状態を示す斜視図、図4は図3のE-E線断面図、図5はワイヤ状部材と第1連結部材の分解斜視図、図6はワイヤ状部材と第1連結部材との係合状態を示す図、図7はワイヤ状部材と第2連結部材の分解斜視図、図8は頭部に聴覚検査用骨導受話装置を装着した状態の平面図である。

【0012】図1に示すように、聴覚検査用骨導受話装置1は、頭部の乳様突起に加振力を与える骨導受話器2と、マスキング用の気導受話器3と、骨導受話器2と気導受話器3を連結すると共に所定の装着力を被検者に与えるヘッドバンド部4と、骨導受話器2及び気導受話器3を被検者にとって所望な状態でヘッドバンド部4に支持させるアジャスト部5などから構成されている。なお、6は気導受話器3に音声信号を入力するコードであり、骨導受話器2に検査信号を入力するコードの記載は

省略している。

【0013】骨導受話器2は、ヘッドバンド部4の一端に設けられた第1連結部材7に骨導受話器保持部材8を介して取付けられている。第1連結部材7には、頭部と対向する内側面に被検者の頭部に当接するパッド部（例えば、発泡ウレタンゴム製）9が固着されている。

【0014】気導受話器3は、ヘッドバンド部4の他端に設けられた第2連結部材10に気導受話器保持部材11を介して取付けられている。気導受話器保持部材11は、ピボット部11aを中心にして、気導受話器3を矢印F方向に回動自在（例えば、約50°程度の角度）に保持している。

【0015】ヘッドバンド部4は、略U字状に形成された弾性体（例えば、ピアノ線、ステンレス鋼など）の2本のワイヤ状部材12からなり、ワイヤ状部材12の一部には、樹脂による被覆12bが施されている。また、互いに対向するワイヤ状部材12の端部は、夫々第1連結部材7と第2連結部材10に取付けられている。そして、左右の連結部材7、10を被検者の顔幅以上に引離そうとすると、略U字状に形成されたワイヤ状部材12に左右の連結部材7、10を互いに近づける方向の弾性力が発生する。

【0016】また、アジャスト部5は、長さが異なる2枚の帯状バンド部材13、14と、これらの帯状バンド部材13、14の両端部に固着した左右一対の取付部材15と、長い方の帯状バンド部材13の中央部とワイヤ状部材12の中央部を互いに接続して固定する固定部材16からなっている。

【0017】長い方の帯状バンド部材13は、弾性部材、例えばバネ性を有する高分子材料で形成され、短い方の帯状バンド部材14は、可撓性部材、即ち柔らかく頭に当接するような部材、例えばフッ素樹脂材、皮革、布等で形成されている。そして、長い帯状バンド部材13と短い帯状バンド部材14は、互いにその面13a、14aを対向させ、且つ弓形形状の状態で配設されている。長い帯状バンド部材13は、その端部13bを左右の取付部材15に、その中央部を固定部材16に固定している。また、短い帯状バンド部材14は、その端部14bを左右の取付部材15に固定している。

【0018】取付部材15は、図2に示すように、中央部で帯状バンド部材13、14の端部13b、14bを固定し、更に両端部に孔部15cを形成してワイヤ状部材12を孔部15cに摺動自在に嵌挿している。固定部材16は、図6に示すように、中央部で帯状バンド部材13の真ん中を固定し、更に両端部に孔部16cを形成してワイヤ状部材12を孔部16cに嵌挿して固定している。

【0019】ワイヤ状部材12の端部12a及び骨導受話器保持部材8を取付ける第1連結部材7は、図5に示すように、一対のケース部20、21からなる。ケース

部20、21には、夫々両端の互いに対向する部位に開口溝20a、21aと、開口溝20a、21aに連通する環状溝20b、21bが形成されている。

【0020】また、一方のケース部20の環状溝20bで開口溝20aから最も離れた部位に凸部20cが設けられ、他方のケース部21の環状溝21bで開口溝21aの近傍に凸部21cが設けられている。更に、ケース部20、21には、夫々中央の互いに対向する部位に凹部20d、21dが形成されている。

【0021】そして、ヘッドバンド部4と第1連結部材7を接続するために、輪状に曲げたワイヤ状部材12の端部12aを、一対のケース部20、21で挟んで開口溝20a、21aに通すと共に、環状溝20b、21bに収納し、更にねじ22で締めてケース部20、21を一体化し、ワイヤ状部材12の端部12aが第1連結部材7から外れないようにしている。

【0022】同時に、第1連結部材7と骨導受話器保持部材8を接続するために、骨導受話器保持部材8を構成する軸部材23の端部23aを輪状に曲げ、その輪状端部23aをスペーサ（不図示）を介して凹部20d、21dに係合する。次いで、ねじ22を輪状端部23aに貫通させ、ねじ22を締めてケース部20、21を一体化させる。すると、軸部材23は回動自在に第1連結部材7に取付けられる。なお、図6はワイヤ状部材12の端部12aがケース部20の環状溝20bに、軸部材23の輪状端部23aが凹部20dに係合している状態を示している。

【0023】そして、第1連結部材7には、図2に示すように、一対のケース部20、21がねじ22締めにより一体化することによって、ケース部20の開口溝20aとケース部21の開口溝21aが合わさり、ワイヤ状部材12の断面積よりも大きい長孔状の開口24が形成される。

【0024】従って、ワイヤ状部材12の端部12aは、第1連結部材7の環状溝20a、21aに収納されているものの、遊嵌状態であり、しかも端部12a近傍のワイヤ状部材12は開口24内で遊挿しているので、第1連結部材7、即ち骨導受話器2はヘッドバンド部4に対し、矢印G方向に振れ自在となっている。

【0025】ここで、骨導受話器保持部材8は、図2に示すように、前記した軸部材23と、保持部材25からなり、軸部材23の一端が第1連結部材7に矢印H方向に回動自在（例えば、約60°程度の角度）に取付けられ、軸部材23の他端に保持部材25が矢印I方向に回動自在（例えば、約20°程度の角度）に取付けられている。更に、保持部材25に骨導受話器2が矢印J方向に回動自在（例えば、約50°程度の角度）に取付けられている。即ち、骨導受話器2は、第1連結部材7に対し、矢印H方向、矢印I方向、矢印J方向の3自由度を有することになる。

【0026】なお、矢印H方向と矢印J方向の2自由度を有する場合であっても、第1連結部材7がヘッドバンド部4に対して矢印G方向に振れるので、骨導受話器2を所望の姿勢にして加振端部2aを乳様突起に当接することができる。

【0027】ワイヤ状部材12の端部12a及び気導受話器保持部材11を取付ける第2連結部材10は、図7に示すように、気導受話器保持部材11と一体に形成された連結本体30と、連結蓋体31からなる。連結本体30と連結蓋体31には、夫々両端の互いに対向する部位に開口溝30a、31aと、開口溝30a、31aに連通する環状溝30b、31bが形成されている。また、連結本体30の環状溝30bで開口溝30aから最も離れた部位に凸部30cが設けられ、更に連結蓋体31の環状溝31bで開口溝31aの近傍に凸部31cが設けられている。

【0028】そして、ヘッドバンド部4と第2連結部材10を接続するために、輪状に曲げたワイヤ状部材12の端部12aを、連結本体30と連結蓋体31で挟んで開口溝30a、31aに通すと共に、環状溝30b、31bに収納する。更に、ねじ32で締めて連結本体30と連結蓋体31を一体化し、ワイヤ状部材12の端部12aが第2連結部材10から外れないようにしている。

【0029】すると、第2連結部材10には、図3に示すように、連結本体30と連結蓋体31がねじ32締めにより一体化することによって、連結本体30の開口溝30aと連結蓋体31の開口溝31aが合わさり、ワイヤ状部材12の断面積よりも大きい長孔状の開口33が形成される。

【0030】従って、ワイヤ状部材12の端部12aは、第2連結部材10の環状溝30a、31aに収納されているものの、遊嵌状態であり、しかも端部12a近傍のワイヤ状部材12は開口33内で遊挿しているので、矢印K方向に第2連結部材10、即ち気導受話器3がヘッドバンド部4に対し、振れ自在となっている。

【0031】以上のように構成した聴力検査用骨導受話装置1の作用について説明する。聴力検査用骨導受話装置1が装着されていない状態では、主にワイヤ状部材12の弾性力により、左右の受話器2、3の互いに対向する面間の距離は、被検者の顔幅よりも短くなるようにしている。また、左右の取付部材15は、帯状バンド部材13、14の弾性力により、最も受話器2、3に近づいた位置にある。

【0032】先ず、普通の頭の大きさの被検者が聴力検査用骨導受話装置1を装着する場合について説明する。被検者が左右の受話器保持部材8、11又は連結部材7、10を持って左右の受話器2、3をワイヤ状部材12の弾性力に抗して顔幅以上に離すと、短い帯状バンド部材14の所定長さで弓形形状により、左右の取付部材15が長い帯状バンド部材13の弾性力に抗し、ワイヤ

状部材12に沿って受話器2、3から離れる方向に移動する。

【0033】次いで、左右の受話器2、3を顔幅以上に離した状態で、聴力検査用骨導受話装置1を頭部上方から下ろしながらパッド部9を頭部側部に、気導受話器3を耳介に当てようとする。すると、第1連結部材7と第2連結部材10の互いに対向する面間の距離が短くなるので、短い帯状バンド部材14が所定長さに設定されていることと、長い帯状バンド部材13の弾性力との協働作用により、左右の取付部材15が、共にワイヤ状部材12に沿って受話器2、3に近づく方向に移動する。そして、短い帯状バンド部材14の面14aが、被検者の頭部頂点近傍に当接すると、短い帯状バンド部材14が所定長さに設定されていることにより、取付部材15は移動を停止し位置決めされる。

【0034】また、気導受話器3が被検者の耳介に当接する際には、図3に示すように、気導受話器3がヘッドバンド部4に対して矢印K方向に振れ自在になっているので、気導受話器3が気導受話器保持部材11に対して矢印F方向に回転自在になっているのと相まって、気導受話器3は耳介に対して最適な姿勢で当接することができる。

【0035】一方、骨導受話器2は、図2に示すように、耳介上方の頭部側部に当接しているパッド部9を基準とする矢印H方向、矢印I方向、矢印J方向の3自由度により、所望の姿勢にして加振端部2aを乳様突起に当接することができる。

【0036】また、左右の受話器2、3をワイヤ状部材12の弾性力に抗して所定の距離以上に離しても、第2連結部材10において、ワイヤ状部材12の端部12aが、図4に示すように、環状溝30b、31bの凸部30c、31cに当接するので、第2連結部材10が不必要に外方向に移動することを防止でき、これにより、良好な装着性を得ることができる。なお、第1連結部材7においても、第2連結部材10と同様にワイヤ状部材12の端部12aが、環状溝20b、21bの凸部20c、21cに当接し、第1連結部材7が不必要に外方向に移動することを防止できる。

【0037】従って、被検者は、図8に示すように、ワイヤ状部材12及び長い帯状バンド部材13の弾性力の働きによる適度な装着力と、ヘッドバンド部4に対する受話器2、3の振れによる受話器2、3の乳様突起40又は耳介41に対する最適な姿勢と、短い帯状バンド部材14の中央部の面14aが被検者の頭部42の頂点近傍に安定に当接することにより、聴力検査用骨導受話装置1を快適に装着することができる。

【0038】次に、耳介から頭頂部にかけての長さが普通の人に比べ長い被検者が聴力検査用骨導受話装置1を装着する場合について説明する。被検者が左右の受話器保持部材8、11又は連結部材7、10を持って左右の

受話器2、3をワイヤ状部材12の弾性力に抗して顔幅以上に離すと、短い帯状バンド部材13の所定長さで弓形状により、左右の取付部材15が長い帯状バンド部材14の弾性力に抗し、ワイヤ状部材12に沿って受話器2、3から離れる方向に移動する。

【0039】次いで、左右の受話器2、3を顔幅以上に離した状態で、聴力検査用骨導受話装置1を頭部上方から下ろしながらパッド部9を頭部側部に、気導受話器3を耳介に当てようとする。すると、被検者は、頭部の頂点と耳介との垂直距離が長いので、気導受話器3が耳介の位置になる前に、短い帯状バンド部材13の面13aが、被検者の頭部の頂点近傍に当接する。

【0040】更に、気導受話器3を耳介の位置まで下げると、短い帯状バンド部材13の面13aに対する頭部の押圧力によって、取付部材15が長い帯状バンド部材14の弾性力に抗してワイヤ状部材12に沿って受話器2、3から離れる方向に移動する。

【0041】そして、気導受話器3が最良な位置で耳介に当たると、短い帯状バンド部材13の面13aが、被検者の頭部頂点近傍に当接した状態で、短い帯状バンド部材13が所定長さに設定されているので、取付部材15は移動を停止し位置決めされる。

【0042】すると、被検者は、図8に示すように、ワイヤ状部材12及び長い帯状バンド部材14の弾性力の働きによる適度な装着力と、ヘッドバンド部4に対する受話器2、3の振れによる受話器2、3の乳様突起40又は耳介41に対する最適な姿勢と、短い帯状バンド部材14の中央部の面14aが被検者の頭部42の頂点近傍に安定に当接することにより、聴力検査用骨導受話装置1を快適に装着することができる。

【0043】

【発明の効果】以上説明したように本発明によれば、骨導受話器側のヘッドバンドに頭部と当接するパッド部を

設けたので、ヘッドバンドを安定に装着した後に、骨導受話器を単独で操作して容易に頭部に当接することができる。

【0044】また、第1連結部材と第2連結部材のいずれか一方又は両方が、ヘッドバンドに対して振れ自在になっているので、頭部への装着が容易となり、しかもより安定に頭部へ装着ができる。

【0045】また、骨導受話器が、第1連結部材に対し2軸又は3軸の自由度をもって取付けられるので、所望の頭部に所望の姿勢で当接することが容易にでき、検査の精度向上が図れる。

【図面の簡単な説明】

【図1】本発明に係る聴力検査用骨導受話装置の正面図
【図2】骨導受話器のヘッドバンドへの取付状態を示す斜視図

【図3】気導受話器のヘッドバンドへの取付状態を示す斜視図

【図4】図3のE-E線断面図

【図5】ワイヤ状部材と第1連結部材の分解斜視図

【図6】ワイヤ状部材と第1連結部材との係合状態を示す図

【図7】ワイヤ状部材と第2連結部材の分解斜視図

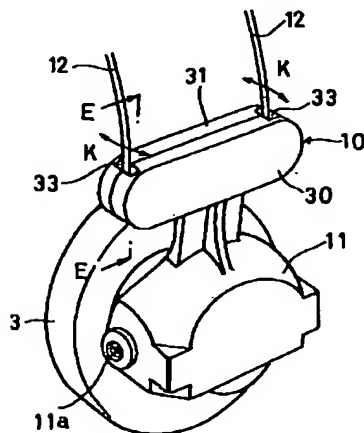
【図8】頭部に聴力検査用骨導受話装置を装着した状態の平面図

【図9】従来の聴力検査用骨導受話装置の正面図

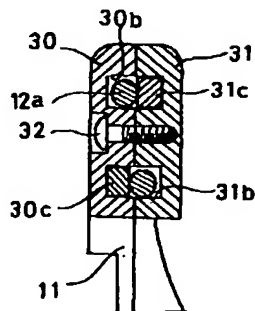
【符号の説明】

1…聴力検査用骨導受話装置、2…骨導受話器、3…気導受話器、4…ヘッドバンド部、5…アジャスト部、7…第1連結部材、8…骨導受話器保持部材、9…パッド部、10…第2連結部材、11…気導受話器保持部材、12…ワイヤ状部材、12a…ワイヤ状部材の端部、20、21…ケース部、30…連結本体、31…連結蓋体。

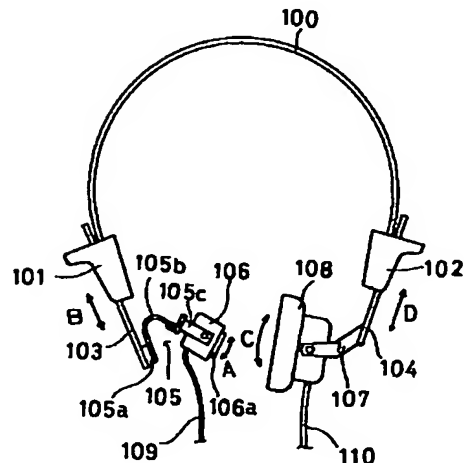
【図3】



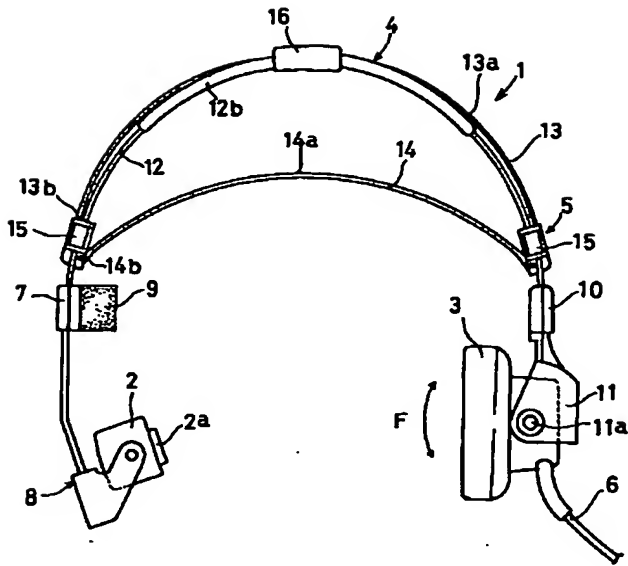
【図4】



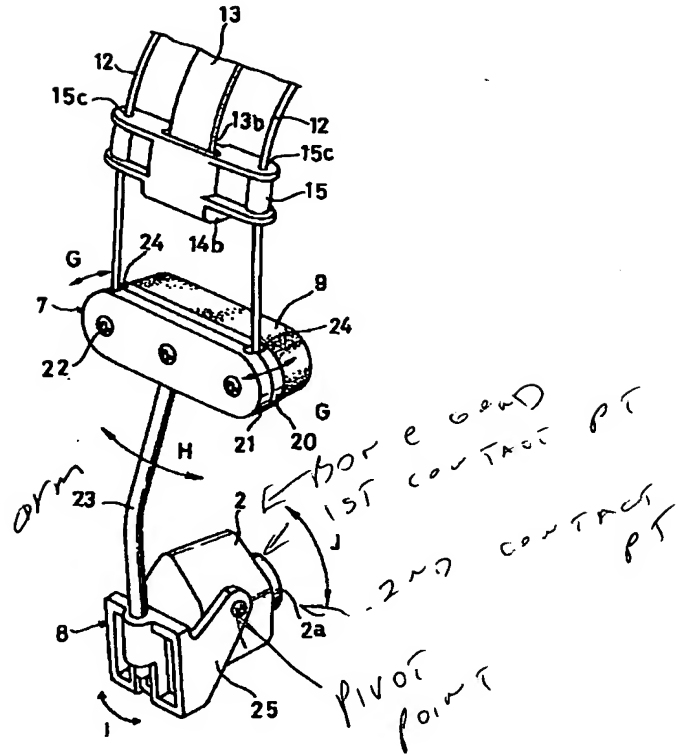
【図9】



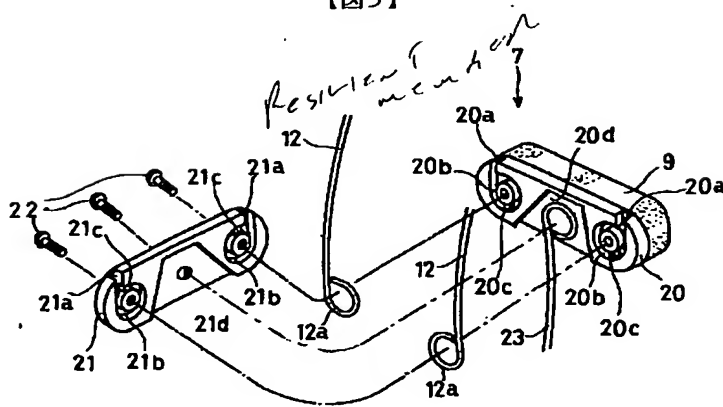
【図1】



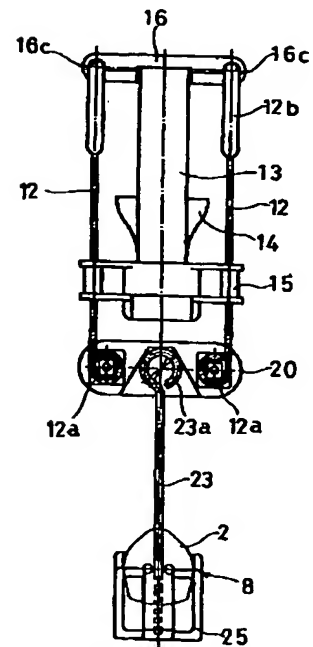
【図2】



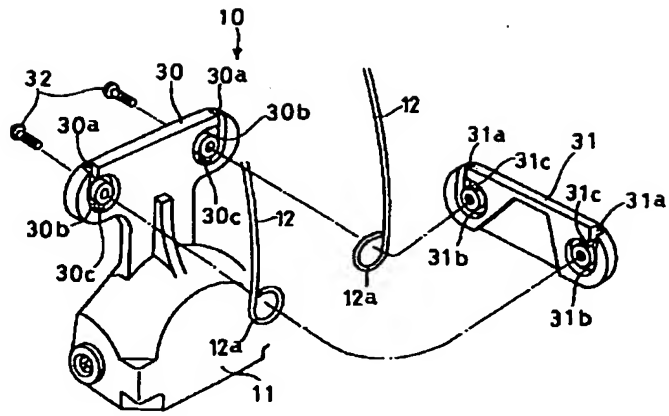
【図5】



【図6】



【図7】



【図8】

